#### **TPC Reconstruction**

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#### Overview

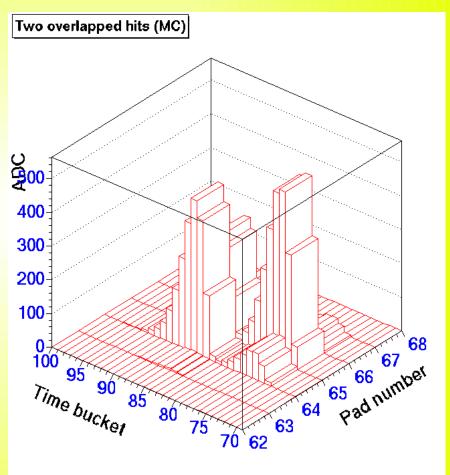
- E910 has a well-documented code, but they have very different underlying data structures, so direct porting is impossible
  - Excellent reference
- My overall approach: make it work first, take care of details later

### Algorithm

- Create hit from raw digits
  - Create 1-D contiguous clusters of digits in the same pad of the same stick
  - Identify peaks within each cluster
  - Ideally, fit each peak with a gamma function (to do).
    - If it is too complicated, then do a weighted mean calculation for the center of the peak (default for now)
  - Group adjacent peaks into hits, calculate the xy-position of the hit by weighted mean

## Algorithm (cont.)

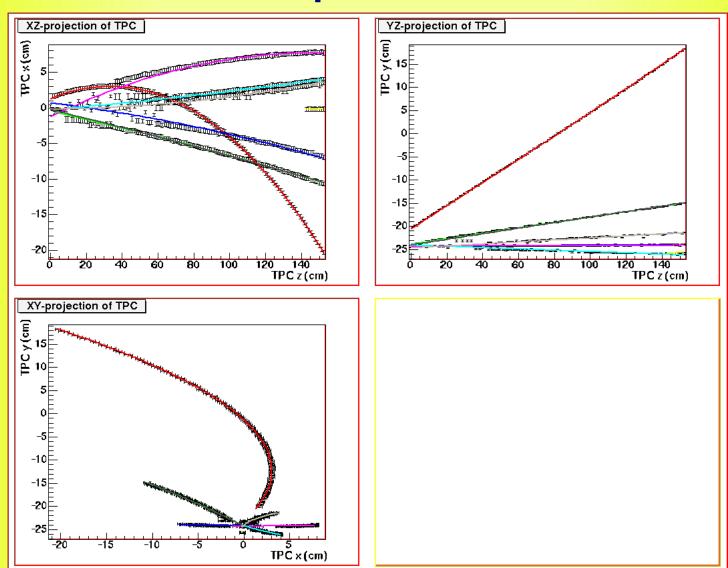
- Form a network of hits in neighboring sticks
  - Look for "overlapping hits" in adjacent sticks, establish up- and down-links
- Feed the network into track finder



### Algorithm (cont.)

- Form tracks
  - Start tracks downstream, and extend them upstream
  - An unused hit and its closest up-link start a track
  - A track is extended upstream if one of the above applies:
    - a) There is only one up-link
    - b) The tracker can choose the best up-link from a list
    - c) The tracker can jump over the gap or confusing set of links
  - Then the track is extended downstream, and procedure repeats until no more hits can be added

# Sample Event



### What is a TPC Track Object?

- List of hits
  - Position
  - Energy deposited
  - Length (over one stick)
- Momentum (from curvature)
- Average dE/dx (particle ID)
- Helicity (charge)

#### To Do List

- Implement gamma function fitting for peaks
- Correct hit positions due to non-uniform B-field
- Identify kinks in tracks (decay inside the volume)
- Calculate track momentum
  - Need B-field
- Calculate dE/dx for tracks
- Find vertices